

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Michael J. Stevenson

SER. NO. 08/914,536

FILED: August 19, 1997

TITLE: METHOD AND COMPOSITION TO ENHANCE
POLYOLEFIN SURFACES

UNIT: 1762

EXAMINER: Erma C. Cameron

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DECLARATION BY ALAN REEVES

I, R. Alan Reeves, declare and say as follows:

The following statements are made of my own knowledge and belief, and if called to testify, I could competently testify to the following:

I am a coapplicant of the above identified application and a coinventor of the subject matter described and claimed therein. The subject invention comprises a method to apply a permanent coating to the surface of molded polyethylene articles by applying a composition of polyethylene powder and colorant in an inert hydrocarbon solvent to the surface of a molded polyethylene article and then heating the coating and the coated surface to an elevated temperature to cause the coating to become fused into the surface of the polyethylene article. The particular combination of the use of polyethylene powder in the composition for the coating of polyethylene articles achieves results in the subject invention which are far superior to the use of other polyolefin powders in that the coatings

I have recently performed comparative experiments that demonstrate that the use of polyethylene powder in the coating composition is far superior to the use of other polyolefin powders. Specifically, I coated the surfaces of rotationally molded polyethylene test cubes with coating compositions which were constituted with polyethylene powder and powders of other, different polyolefins. The test cubes were 8 inches x 8 inches x 8 inches and were obtained by the rotational molding of a conventional, granulated, white polyethylene molding resin having a size range of 35 mesh. The following coating compositions which were used:

<u>Comp. No. 1</u>		<u>Comp. No. 2</u>	
Polyisobutylene:	50	Polyvinyl Chloride:	200
Carbon Black:	5	Carbon Black:	10
Toluene	200	Toluene:	100
<u>Comp. No. 3</u>		<u>Comp. No. 4</u>	
SBR*	50	Polybutene:	50
Carbon Black:	5	Carbon Black:	5
Toluene:	250	Toluene:	200
*styrene-butadiene rubber			
<u>Comp. No. 5</u>		<u>Comp. No. 6</u>	
EVA*	90	Polystyrene:	50
Carbon Black:	10	Carbon Black:	5
Toluene:	300	Toluene:	200
*poly(ethylene-vinyl acetate)			

The control composition, for comparative testing was:

<u>Comp. No. 7</u>	
Polyethylene:	90
Carbon Black:	10
Toluene:	200

Variations in the coating compositions were only made to obtain compositions suitable for spray application. Because the poly(ethylene-vinyl acetate) and the polyethylene were solid powders, I added a minor amount of a hydrocarbon resin to compositions 5 and 7 to obtain sprayed coatings with these compositions which covered the polyethylene surfaces. The hydrocarbon resin I used was a resin which was known to have no effect on the adhesiveness of coatings after the heat treatment.

Each of the aforementioned compositions was sprayed onto a surface of a white, polyethylene test cube and each of the coated surfaces was heated with a forced air, Bosch heat gun to a temperature in excess of 250 degrees F. for a period of one minute. The coatings were stored at room temperature for 24 hours and then the coated surfaces were cut from cubes and divided into two samples which were subjected to the tests described in the following paragraphs.

One sample of each of the coated surfaces was scored with a razor blade in a grid pattern of criss-crossed parallel score lines and a pressure sensitive masking tape was applied and pressed tightly over each of the grid patterns. The masking tape was then pulled from the surface and the surface was inspected to determine if the tape lifted the coating from the polyethylene surface. The inspection revealed that coatings of all the compositions, except for Compositions 5 and 7 failed the test. The coating of Composition 1 split, with the tape removing the outer half surface, the coating of Composition 2 completely peeled off with the tape; the coating of Composition 3 separated from the polyethylene surface along the score lines; the coating of Composition 4 split, similar to that of Composition 1; and the coating of Composition 6 completely peeled off with the tape. The tapes on the coatings of Compositions 5 and 7 separated cleanly from the coatings without removing any significant amounts of the coatings.

The second samples of each of the coated surfaces were then tested for solvent resistance. In this test, each sample was placed in a closed container with 500 milliliters of lacquer solvent and the containers were tumbled for one hour at room temperature. The containers were opened, the color of the solvent was observed and each sample was inspected to determine the condition of its coating.

All of the samples failed this test, except for the coating of composition 7 which contained the polyethylene powder. The solvent from the testing of the sample coated with composition 7 was clear with no grey or black coloration and free of any flakes or particles of the coating.

The solvents from all the other samples were black in color and contained flakes of the coatings. The inspection of the coatings revealed that the coatings of Composition Nos. 2 (polyvinyl chloride) and 6 (polystyrene) were completely removed and the polyethylene surfaces of these samples were as white as the uncoated surfaces of the molded polyethylene test cubes. The coatings of Compositions 1 (polyisobutylene) and 4 (polybutene) were light to medium grey coloration, indicating that most of the coatings had dissolved in the solvent. The coating of Composition 3 (styrene-butadiene rubber) was a dark grey color, however, the coating completely separated from the polyethylene surface when rubbed with a cloth. The coating of Composition 5 (poly ethylene-vinyl acetate) was etched by the solvent.

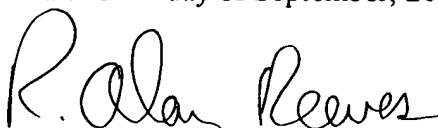
The peel and solvent resistances of the coating from Composition 7 evidence that the coating was incorporated by fusion into the surface of the molded polyethylene surface, whereas all the coatings from the other compositions did not fuse into the polyethylene surface.

For several years I have worked on formulation of various compositions

suitable for use in the invention and I have attempted to use polyolefins other than polyethylene for application to the surfaces of molded polyethylene articles. Only compositions containing polyethylene powders have been found to be universally adaptable to yield coatings which fuse into the surface of a molded polyethylene article and which consistently pass the inspections of peel and solvent resistance described in this declaration.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent resulting therefrom.

Declared at Clarkdale, Arizona this 9th day of September, 2003.

A handwritten signature in black ink that reads "R. Alan Reeves". The signature is written in a cursive, flowing style with a large initial "R".

R. Alan Reeves